

ENERGY INNOVATION IN CANADA

Overview

In this activity, students will use the Great Canadian Electricity Giant Floor Map to better understand electrical innovation in Canada. They will begin with a mock survey inspired by Electricity Human Resource Canada's national inquiry into Millennial and Gen Z perceptions of the industry, followed by an exploration of innovative energy projects taking place in varying geographies within Canada. Students will be challenged to evaluate their own understanding of the industry and will have the opportunity to reflect on how working in the sector can help combat climate change.

After completing the lesson, students will be able to answer the questions:

- How do today's youth perceive the electricity industry?
- What is their own perception of the industry?
- What jobs are common in the industry?
- What kinds of projects are taking place in Canada that support a commitment to net-zero energy production?

Time

70 minutes (can be divided)

Grade

6 - 9 (modifications provided for younger and older students)

Lesson implementation

Minds on (15 minutes)

To begin the activity, invite students to stand around the border of the map. Ask everyone to locate and stand on a component of the map that is a part of the Canadian electricity sector. Assess where everyone has chosen to stand. Are there any patterns? For example, did most students choose to stand on a transmission line or an electricity facility symbol? Did anyone consider standing on a renewable source of energy such as a forest or a lake?

Next, challenge students to take turns calling out job titles within the electricity industry that relate to what they are standing on. For example, a student standing on a transmission line may provide the example of a power line technician. A student standing on a solar facility may think of a solar project engineer. And a student standing in a forest may refer to an environmental consultant. Record how many different job titles are mentioned and point out any patterns in student responses (e.g.: Are most jobs related to the engineering and technology fields? Is there an equal mix of hands-on versus office jobs?). Conversely, if a few jobs are mentioned, discuss this as well. What are some potential reasons for why students are having difficulty naming different jobs?

Say the following statement out loud, and invite students to respond in one of three ways. Record their answers, as you will revisit this statement at the end of the activity.

- Statement:
 - *I feel I know a lot about the Canadian electricity sector.*
- Possible responses:
 - *Thumbs up if they agree.*
 - *Thumbs sideways (parallel to the ground) if they somewhat agree.*
 - *Thumbs down if they do not agree.*

Explain to students that a Canadian organization called [Electricity Human Resources Canada](#) (EHRC) asked this same question (and many others) in a survey of 1,500 Canadians from across the country (aged 18 to 36) to see what their answers were. The goal was to better understand Millennial and Gen Z impressions of the electricity sector and to shine a light on what the electricity industry could be doing better in terms of communicating research and employment opportunities to youth.

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Subjects

- Geography
- Social studies
- Environmental science
- Science
- Technology

Topics

Careers in electricity; energy production and transmission; public perception of the electricity industry; electrical innovation in Canada

Materials

- Teacher survey (1)
- Dry erase markers
- Energy innovation cards (8)
- **Optional:** Legends (5)
- **Optional:** Devices connected to the internet for student research

Learning objectives

Upon completion of the lesson, students will be able to:

- Make connections between Canada's energy landscape and the skills and careers needed for maintenance and innovation.
- Describe youth perceptions of the electricity industry and the reasons behind those perceptions.

Action (45 minutes)

Part 1: The mock survey

Explain to students that they will now take part in a mock survey for the purposes of understanding some of the key questions asked by EHRC in their survey. Students will also compare their responses to those obtained by EHRC through their survey.

Ask students to stand along the border of the map. Use the **Teacher survey** as a reference and follow the instructions to proceed through the survey. If time is a concern, feel free to shorten the survey by picking and choosing which questions you would like to ask the group. Be sure to share student responses to the national responses collected through EHRC's survey. Encourage student reflection on similarities/differences between the two. Note any interesting patterns in student responses and use the potential discussion questions to elaborate on the survey questions.

Once the survey is complete, ask students if they were surprised by any parts of this activity. Invite them to share their thoughts on what they felt were the most important questions and/or if they felt any questions were missing from this activity (Note: The questions included in the **Teacher survey** are a subset of the full set of questions available in the [Generation Impact survey report](#)). What are some potential positive outcomes of EHRC (and, more broadly, the electricity industry) better understanding Canadian youth potentially interested in this sector? What are some next steps the electricity industry could employ to activate further interest in this sector? What information do the youth of today need to feel empowered to consider a career in electricity?

Part 2: Energy innovation in Canada

Have students walk around the map and decide as a group (or as smaller groups) on the top two sources of electricity generation in Canada based on the number and size of the different electricity facilities displayed on the map. They should be able to rank the sources in the following order:

- Hydro (60%)
- Nuclear (15%)
- Natural gas, petroleum, and other (12%)
- Coal (7%)
- Wind, solar, and other renewables (6%)

Note that coal makes up a much smaller fraction than renewable or non-emitting energy sources. This is positive news for our country! In fact, Canada has one of the cleanest electricity grids in the world. More than 80 per cent of our electricity comes from non-emitting sources, such as hydroelectricity, wind, solar, and nuclear. With such unique geography and so many opportunities for clean energy generation, Canada is also a leader

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- Summarize various examples of electricity innovation in Canada influenced by geography and regional supply and demand.
- Think critically about how individuals, families, schools, communities, and organizations can take part in a commitment to a greener energy future.

Connections to the Canadian Geography Learning Framework

Geoinquiry

- Ask geographic questions
- Interpret and analyze
- Communicate

Geospatial skills

- Foundational elements
- Spatial representations

Concepts of geographic thinking

- Interrelationships
- Geographic perspective

in energy innovation. In the coming decades, a strong workforce with the skills needed to design, run, and maintain these innovative technologies will be crucial to Canada's commitment to net-zero emissions by 2050.

Explain to students that they will now have the opportunity to learn more about some of the most fascinating technologies and innovations currently being researched and designed in Canada – things they could become involved in as they begin to pursue their post-secondary education and careers!

Break students into small groups or pairs and provide each group with an **Energy innovation card**. Have the groups each work through a think-pair-share exercise using the instructions on their cards. Once each group has had time to complete all tasks on their cards, lead a brief class discussion in which one representative from each group summarizes the technology they learned about – if anyone is interested in learning more about a particular technology, allow some time for student-led research.

Conclusion (10 minutes)

With the class seated on the Giant Floor Map, say the following statements out loud and invite students to respond in one of three ways, after considering the new knowledge they have gained about Canada's electricity sector. After each statement, assess the majority response from the class.

- Statements:
 - *The electricity sector is moving towards more renewable energy sources and technologies...working in the sector means helping to solve for climate change.*
 - *The growth of new technologies is changing the ways in which energy is delivered and stored, creating new opportunities for innovative problem-solvers who want to work in the sector.*
 - *Canada has one of the cleanest electricity grids in the world.*
- Possible responses:
 - *Thumbs up if they agree.*
 - *Thumbs sideways (parallel to the ground) if they somewhat agree.*
 - *Thumbs down if they do not agree.*

Finally, revisit the statement presented to students in the **Minds on** activity to see if students' understanding of the electricity sector has changed. If it has, discuss why they opted to change their response from earlier. If it has not, brainstorm as a class the next steps that can be taken to further improve everyone's understanding of the sector (see the **Learning to action** section for ideas!).

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Modifications

There are many ways in which this activity can be modified for different age groups. Here are some of our suggestions:

Younger students:

- Take students on a tour of the classroom or school and brainstorm all the ways in which electricity is used. Talk about possible jobs related to the examples they come up with. For instance, if they see power which delivers electricity to the school, they may say that there's someone who needs to take care of those power lines and ensure they are in proper working order: a power line technician! Visit [this list](#) of potential jobs in the electricity sector by Electricity Human Resources Canada for inspiration.
- Have a discussion around the question: What would life be like without electricity? Have students walk along the transmission lines on the Giant Floor Map and consider all the places that would have to obtain energy in alternative ways if electricity was not an option.

Older students:

- Allow time for a complete review of the [Generation Impact survey report](#). Have students focus on the key takeaways and consider what recommendations they would have for the industry leaders looking to recruit new members in the workforce.
- If students have a curiosity about what it's like to work in the industry from a student perspective, invite them to explore the Electricity Human Resources Canada [YouTube playlist](#) of student testimonials.
- Allow students time to research green energy in the news as a follow-up to learning about the new technologies that will be powering Canada's future. The following websites are a good starting point:
 - [The Solutions Project: Clean energy in the media](#)
 - [Clean Energy Canada: Making headlines](#)

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- [Science Daily: Clean energy news](#)
- [Global news: Renewable energy](#)
- Assign research projects where students can delve deeper into specific new energy technologies and their impacts. A comprehensive report might cover any relevant terminology or scientific concepts associated with the technology, its energy efficiency and ease of integration, as well as any case studies and potential real-world applications.
- Organize a debate where students can take on different roles and perspectives related to renewable energy and climate goals. Assign some students to represent government officials, industry leaders, environmental activists, or scientists to discuss challenges, opportunities, priorities, and potential solutions in transitioning to renewable energy sources.
- Challenge students to conduct an economic analysis of renewable energy projects. They can explore the costs, benefits, and potential returns on investment associated with various new energy technologies. Students can then create feasibility studies to determine the viability of a renewable energy initiative in a particular region of Canada.

Extend your learning

Once students have had a chance to learn about innovations in the electricity industry, encourage them to take their learning beyond the classroom! Here are some suggested extension activities:

- Electricity innovation can be big or small! Have students create a list of electricity-related industries or organizations in their community. Visit their websites and social media pages to see if there are innovative technologies or projects happening that they were not previously aware of. Reach out to these organizations inquiring about opportunities for students to take part in work-integrated learning or workshops.
- The university of Alberta has prepared an [interactive map](#) about Canadian renewable energy projects. Students can explore the map and can work together to organize a field trip to locations which permit public or educational visits. Many of these organizations provide free tours to the public.
- Create a clean energy taskforce for your school in which students take on the responsibility of encouraging the school community to cut down on electricity consumption and unnecessary solid waste with the objective of reducing the school's carbon footprint. Competitions can be organized to see which classrooms or offices can use the least amount of energy for one month. Students can map out safe transportation routes to encourage students to walk or bike to school. The cafeteria can research the feasibility of having more plant-based proteins and local ingredients on the menu.

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- Indigenous energy projects are at the forefront of Canada's commitment to net-zero emissions by 2050. Students can research and present on different [Indigenous projects](#) currently being funded by the government of Canada.
- Students interested in pursuing studies or a career in the electricity sector can research opportunities to volunteer with green organizations - this type of engagement is frequently requested on bursary applications and resumes.

Supporting resources

- [The Government of Canada: Advanced Clean Energy Program](#)
- [David Suzuki Foundation: Policy Options for a Clean Electricity Standard in Canada](#)